

# Magnetic Suspension System

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**Abstract-** This project is based on the suspension system of a two-wheeler vehicle which were formally depending upon spring type, hydraulic and pneumatic suspension systems. This report gives information about the magnetic suspension system and the magnetic suspension system is turning out to be the new option to these conventional suspension systems. The aim of this report is to study and investigate the response of the system, when it is subjected to road surface irregularities. This project presents the design, construction and working of the magnetic suspension system. This system uses magnets and spring as passive dampers, which are used to reduce the displacement and acceleration of the sprung masses. By using this type of absorber we can absorb more number of shocks and vibrations with more accuracy. This type of suspension has no problem of leakage of oil like in hydraulic suspension system. Also this system has less maintenance than other types of shock absorbers and we can make this type of shock absorbers for the efficient work of vehicles.

**Keywords-** Magnets, Coil Spring, Magnetic Shock Absorber, etc.

## I. INTRODUCTION

We made a model of the Magnetic Shock Absorber which is mainly based on the application of magnetic property like when the same poles of two magnets come in contact with each other then they are repulsed from each other. This unit is mounted in a vehicle such as other type of shock absorber. The working is the shock absorber is very simple. Three magnets are mounted in this way that one is fixed in the centre, one is mounted below and the other one is on the upper side. Poles of these magnets are same at inner sides so that they are repulsed from each other and space is made between them due to this. When the vehicle is running on the bump or the muddy road then the space between the three magnets is reduced and then shocks and variations present in the vehicle absorbed by repulsion property of the magnet. This system is having the tendency to eliminate the use of conventional suspension system due to its low cost and less maintenance capacity. The basic role of suspension is to isolate the vehicle from the road shocks and vibrations so that it could be a comfortable ride for these passengers and goods and they are in their proper condition too. The suspensions act as a link

between vehicle tires and chassis. The vibrations from the wheels are reduced by suspension only.

The suspension gives the cushioning effect. The suspension system consists of a spring & damper. The energy of road shocks cause the spring to oscillate. These oscillations are restricted to a reasonable level by the damper, which more commonly called a Shock Absorber.

## II. Problem Statement

As we know the disadvantages of our conventional suspension system, in order to overcome these disadvantages the magnetic suspension system can be an option to the same. Therefore, the magnetic suspension system can be used in many applications of the suspension in Automobile industries and in other industries.

## III. Objectives

- To prevent the road shocks from being transmitted to the vehicle Components.
- To safeguard the occupants of vehicle from road shocks.
- To preserve the stability of the vehicles in pitching or rolling while in motion.
- To reduce the maintenance as well as initial cost.
- To increase the life of coil spring.
- To reduce the overall cost and weight of the vehicle.
- To prevents the vehicle body and frame from road shocks.
- To gives the good road holding while driving, cornering and braking.
- To gives cushioning effect.

## IV. LITERATURE REVIEW

A motorcycle's suspension serves a dual purpose: contributing to the vehicle's handling and braking, and providing safety and comfort by keeping the vehicle's passengers comfortably isolated from road noise, bumps and vibrations. The typical motorcycle has a pair of fork tubes for the front suspension, and a swing arm with one or two shock absorbers for the rear suspension.

A shock absorber (in reality, a shock "damper") is a mechanical or hydraulic device designed to absorb and damp shock impulses. It does this by converting the kinetic energy of the shock into another form of energy (typically heat) which is then dissipated. Most shock absorbers are a form of dashpot.

Pneumatic and hydraulic shock absorbers are used in conjunction with cushions and springs. An automobile shock absorber contains spring-loaded check valves and orifices to control the flow of oil through an internal piston. One design consideration, when designing or choosing a shock absorber, is where that energy will go. In most shock absorbers, energy is converted to heat inside the viscous fluid. In hydraulic cylinders, the hydraulic fluid heats up, while in air cylinders, the hot air is usually exhausted to the atmosphere. In other types of shock absorbers, such as electromagnetic types, the dissipated energy can be stored and used later. In general terms, shock absorbers help cushion vehicles on uneven roads.

**Difference between Magnetic Shock Absorber and Spring Shock Absorber:**

Sr. No.	Magnetic Shock Absorber	Spring Shock Absorber
1.	It has more life	It has less life
2.	Life is nearly about approximately 20 years	Life is nearly about approximately 10 years
3.	The weight of magnet is more	The weight of spring is low as compared to magnets
4.	If the power of magnets decreases then it is possible to recharge and it able to use again and again	Its strength at spring is decreased or loss it is necessary to replace it new one
5.	It has very low maintenance	It has more maintenance

**III. WORKING PRINCIPLE**

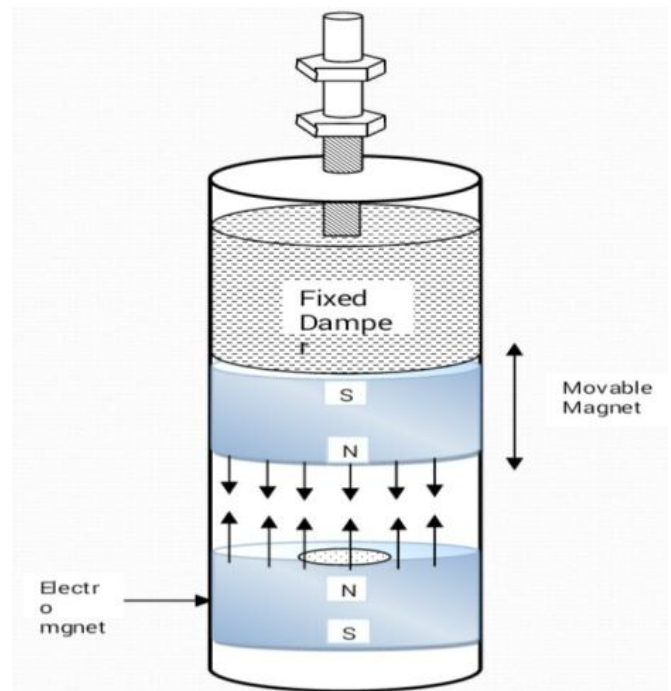
**III.I Working Principle of Conventional Shock Absorber:**

Shock absorber device is used for reducing the effect of sudden shocks by the dissipation of the shock's energy to the automobile springs & shock absorbers are mounted between the wheels and the frame. When the wheels hit a hole or a raised spot on a road, the spring absorber absorbs the resultant shock by expanding & contracting. To prevent the spring from shacking the frame excessively, their motion is restrained by shock absorber, which are also known by the more descriptive term "dampers".

**III.II Working Principle of Magnetic Shock Absorber:**

Magnetic Shock Absorber which is mainly based on the principle of magnetic property like when the same poles of two magnets come in contact with each other then they are repulsed from each other. This unit is mounted in vehicle such as other type of shock absorber.

When the vehicle is running on the bump or the muddy road then the space between two magnets is reduced and then shocks and variations present in the vehicle are absorbed by repulsion property of the magnets. By using this type of absorber we can absorb more number of shocks and variations with the more accuracy. This shock absorber has no problem of leakage of oil like hydraulic shock absorber. Also this has less maintenance than other types of shock absorbers.



**Figure: Working Principle of Magnetic Suspension system.**

**VI. CONCLUSION**

As we have seen the magnetic suspension system is a revolutionary idea which will provide a comfortable ride by minimizing the vibrations and other factors. It would also allow us to set the suspension stiffness as per requirement. Thus magnetic suspension system will be a better substitute for current problems and providing ultimate vehicle dynamics.

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